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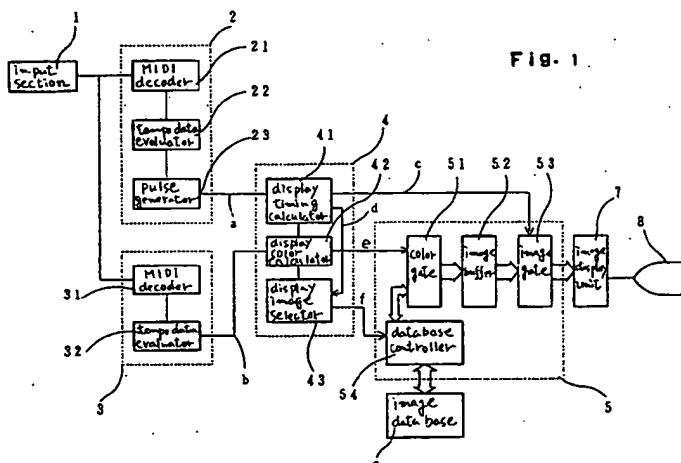
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W-8000 München 80(DE)(54) **Animation image composition and display device.**

(57) An animation image composition and display device is used for the display of still animation images in sequence on a display in time with the reproduction of music by a digital sound source (1) driven by MIDI signals. The device reads a series of specified or optional animation images from an image database (6), which holds many animation im-

ages, and transmits them in accordance with tempo data which forms part of the MIDI data. The device also uses pitch data to determine the color of the animation images to be displayed. The device composes the still images and the specified colors and displays them on a visual display medium (8).

**EP 0 473 043 A2**

itself is configured from various data elements including tempo data which relates to the pace of musical reproduction, pitch data which relates to the pitch of the music, wave form data which relates to the tone of the music and effective sound data which relates to the overall musical effect. Of the above types of data, this invention uses the tempo data as animation image frame feed data and the pitch data as animation image color determination data. The animation images themselves each consist of a set of still images and are stored in an image database.

In other words, the above configuration enables the display of dynamic images on a visual display medium without the inclusion in the MIDI signals of any extra data in addition to the music data, thereby making it possible to keep the unit volume of the data to a minimum without in any way impairing the performance of the music itself. There is, furthermore, no increase in the time or cost of data transmission. Also, since image data does not have to be added to the music data, there is thus no need to think in terms of images during the initial creation of the music data. Moreover, since the music and the animation images are configured independently, the invention effectively constitutes a means for the free combination of these two individual elements.

Next, the preferred embodiment will be explained block by block in accordance with functional precedence. Broadly speaking the preferred embodiment is configured in terms of eight different blocks. To be more precise, it comprises an input section 1, a tempo detector 2, a pitch detector 3, an image composition controller 4, an image composer 5, an image database 6, an image display unit 7 and a visual display medium 8. Of these, the input section 1 inputs MIDI data to the subsequent blocks, said MIDI data having been branched in parallel from the MIDI data input to the sound source (omitted from the drawing). The tempo detector 2 extracts tempo data from the MIDI data after which it generates a pulse, which is synchronized with said tempo data, and outputs it to the image composition controller 4. The pitch detector 3 extracts pitch data from the MIDI data and outputs parameters for the determination of the color to be displayed on the visual display medium 8 to the image composition controller 4. When said tempo data and pitch data are input to the image composition controller 4 it is, of course, necessary for it to be processed into an effective form of data by any of various means such as wave form conversion and level shift. On the basis of an image synchronization pulse received from the tempo detector 2 and display color data received from the pitch detector 3, the image composition controller 4 specifies the relevant addresses while at the same

time issuing the appropriate instructions to the image composer 5 in the next block in respect of foreground color, background color and display timing. The image composition controller 4 also determines the appropriate sequence of animation images to be read out of the image database 6. The image composer 5 then reads the image related data determined by the image composition controller 4 out of the image database 6 and, after composing the animation image in accordance with the specified display and background colors, transmits it to the image display unit 7 in accordance with the display timing signal c. On receipt of the digital image signal, the image display unit 7 converts it to a video signal and displays it in the shape of a still animation image on a visual display medium 8 such as a monitor screen. The image database 6 makes use of a storage medium such as an optical disk to store a plurality of sets of animation images, each said set comprising a sequence of image patterns. The images determined by the image composer 5 can thus be read out of said database.

Next, there follows a more detailed explanation of the blocks inside the main blocks outlined above. The tempo detector 2, which constitutes the first block, is configured from a MIDI decoder 21, a tempo data evaluator 22 and a pulse generator 23. The MIDI decoder 21 converts the MIDI data received serially from the input section 1 into N bit data units which are then output to the tempo data evaluator 22. The tempo data evaluator 22 analyses the input MIDI data and either skips over it in cases where it finds no tempo data included or else triggers the pulse generator 23 in cases where it identifies tempo data. The pulse generator 23 then outputs an image synchronization pulse a to the image composition controller 4.

The pitch detector 3 is configured from a MIDI decoder 31 and a pitch data evaluator 32. The MIDI decoder 31 converts MIDI data into N bit data units. The pitch data evaluator 32 analyzes the converted data in sequence and wither ignores it in cases where it finds no pitch data included or else outputs it in unaltered form as pitch data b to the image composition controller 4 in the next main block in cases where it identifies pitch data. The image composition controller 4 into which the image synchronization pulse a and the pitch data b are input, comprises a display timing calculator 41, a display color calculator 42 and a display image selector 43. The display timing calculator 41 first processes the input image synchronization pulse a after which it controls the timing of the output of the image signal by outputting a one bit display timing trigger signal c to the image composer 5 in accordance with the tempo of the musical performance. At the same time, the display color calcula-

tempo. The adoption of the preferred embodiment described above in conjunction with a karaoke reproduction device whereby a digital sound source analyzes MIDI data for the generation of audio signals, which are then fed through an amplifier and subsequently reproduced as music, is a known configuration. The MIDI data is, however, read simultaneously from the input section 1. Then, on receipt of some sort of trigger signal, the display image selector 43 selects a sequence of thematic animation images from the image database 6. At the same time, the pitch detector 3 extracts pitch data for the purpose of determining the color of the animation image. Similarly, the tempo detector 2 also simultaneously extracts tempo data and outputs animation image frame feed timing signals to the image gate 53 such that the animation image frames are fed through one by one for display on the visual display medium 8. Furthermore, the animation image themes are given a loop format such that the display of a sequence of animation images can be started at any point in the development of a theme without imparting a sense of unnaturalness to the viewer. This removes the need for specification of a start screen address and this in turn enables the creation of a simpler program from the data processing point of view.

Claims

1. An animation image composition and display device, used in conjunction with a karaoke device which drives a digital sound source (1) by means of MIDI data for the reproduction of music, said animation image composition and display device comprising:

a tempo detector (2) which identifies tempo data from said MIDI data and which generates a sequence of pulses which are synchronized with the tempo at which the music is reproduced,

a pitch detector (3) which identifies pitch data from said MIDI data and which outputs said pitch data in sequence, and an image composition controller (4) comprising a display timing calculator (41), which outputs trigger signals in accordance with the timing of the aforementioned pulses, a display color calculator (42), which processes said pitch data in order to determine the foreground and background colors, and a display image selector (43), which selects one or more items of animation data from an image database (6) in which are stored a plurality of sets of animation images in data form, said animation image composition and display device also being used to com-

pose said selected items of animation data and said determined colors and to display still images on a visual display medium (8) one frame at a time by way of an image gate (53) which opens in response to said trigger signals.

2. An animation image composition and display device according to claim 1 which comprises a manual input device (46) as means for selecting animation data, and which determines specific animation images in accordance with input of symbols corresponding to each individual set of animation images respectively to a display image selector (43).
3. An animation image composition and display device according to claim 1 which determines specified animation images in accordance with codes processed as required from pitch data as means for selecting animation data.
4. An animation image composition and display device according to claim 1 which incorporates a selector switch (44) for switching between manual mode and automatic mode as means for selecting animation data.
5. An animation image composition and display device according to claim 1 which makes use of an optical disk device as an image database (6).
6. An animation image composition and display device according to claim 1 which uses a monitor screen as a visual display medium (8).
7. An animation image composition and display device according to claim 1 which incorporates a MIDI decoder (21, 31) for conversion of serial MIDI data in the input area of the tempo detector (2) and the pitch detector (3) to N bits of parallel MIDI data.

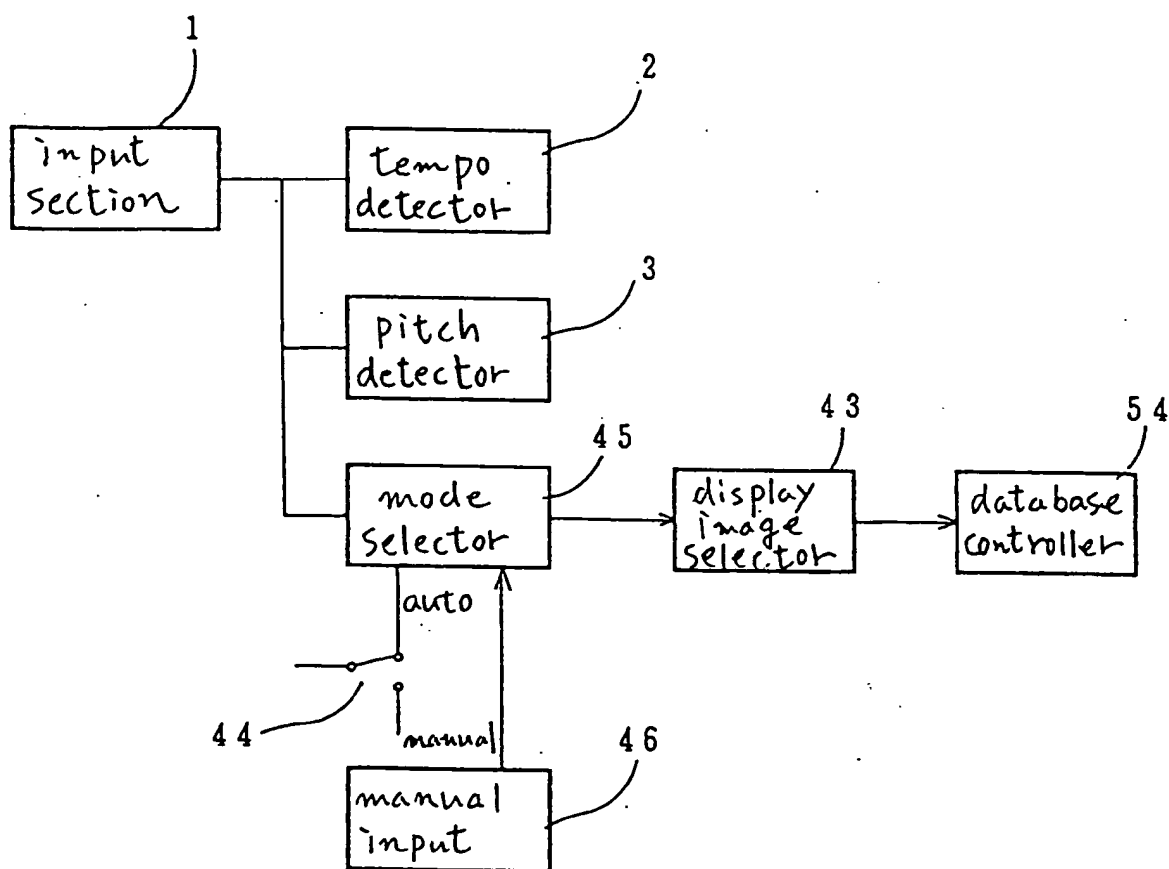


Fig. 2

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EP 0 473 043 A3



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EUROPEAN SEARCH REPORT

Application Number

EP 91 11 3914

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 913 539 (LEWIS) 3 April 1990 * abstract; claim 1 * * column 2, line 27 - line 41 * ---	1,6	G06F15/72
A	EP-A-0 303 700 (SONY CORP.) 22 February 1989 * page 1, line 28 - page 2, line 15 * -----	1,5-6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 JANUARY 1993	Examiner PIERFEDERICI A.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			